

DIY ultra high performance 100 litre sealed box subwoofer

Design goals:

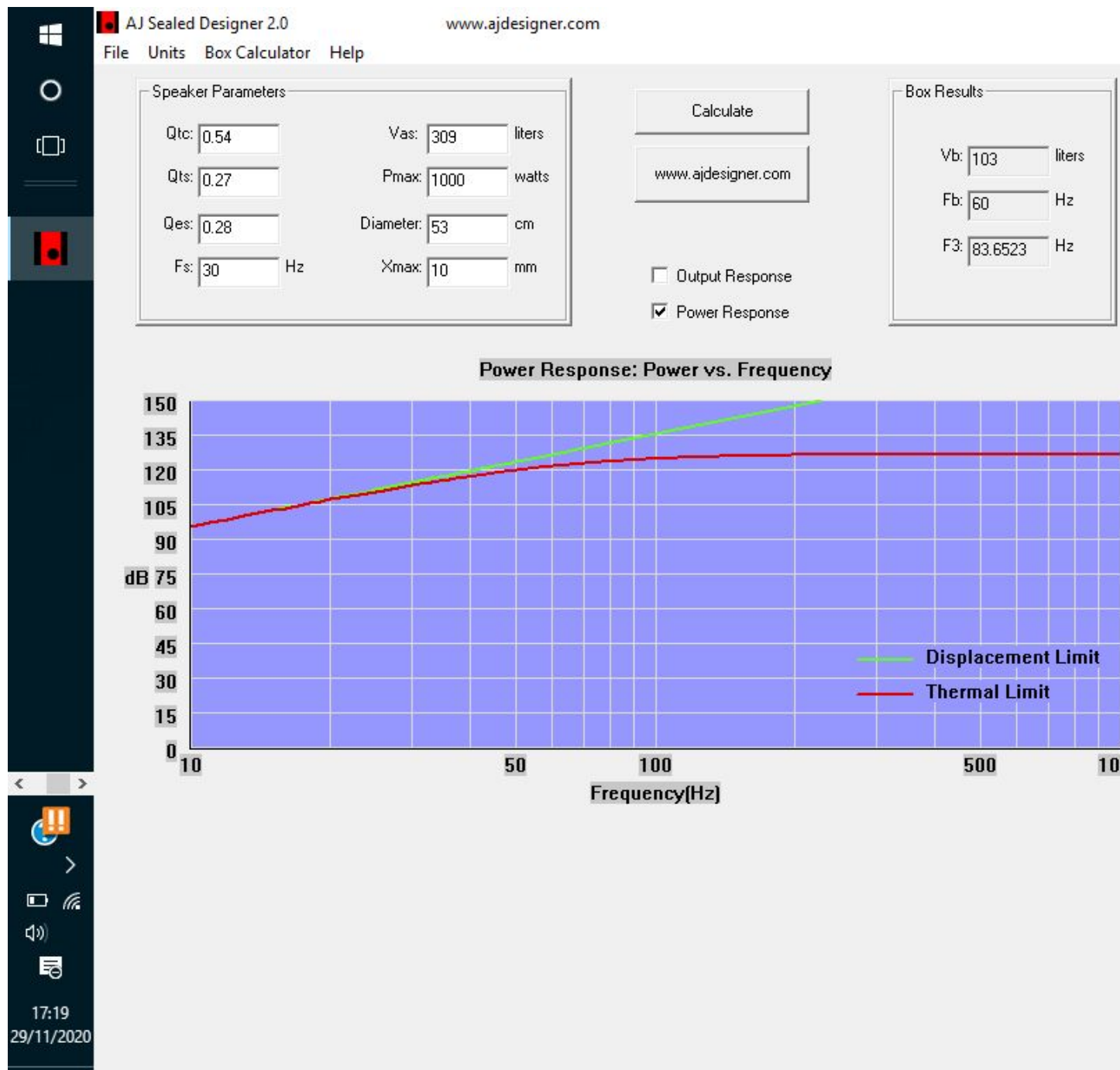
- (1) Simple design and build requiring no specialised skills or electronics knowledge above basic woodworking and ability to connect modular “plug and play” components.
- (2) Ultra high performance in absolute terms,(see target specs) plus the ability to consistently meet these design specs in a wide variety of real world rooms and acoustic environments.
- (3) DSP active crossover with multi channel Eq, driver delay and room measurement ability required, DBX PA 2 highly recommended for performance and value.
<https://dbxpro.com/en/products/driverack-pa2>
- (4) No compromise on performance, quality or components, reliability or domestic acceptability (WAF).
- (5) Main compromise on cost. The 21 inch Pro driver, amplification and DSP/crossover are expensive. The cabinet (24mm birch ply) is small (and acoustically inert) so will not be expensive compared to conventional large (and resonant) ported/horn/TL cabinets.
- (6) Modular approach ie Single, pairs or multiple subs can be scaled if live sound (above 120dB/1meter at 20Hz) levels are required.
- (7) Accurate, low distortion “**Real world**” in room performance with music, movies or games using a single corner placed subwoofer “flat to 20Hz” at SPL’s which can be easily matched with a wide range of ultra high performance two channel/multi channel systems.

Target specification for single subwoofer in half space ie No rear wall or corner gain which will give performance boost of +3dB and +6dB respectively. (See link for more on room gain).

https://www.prosoundtraining.com/site/wp-content/uploads/2012/03/VOL36_DEC08_Boundaries-1.pdf

- (1) Use **Extended Low Frequency “ELF”** principal to achieve highest quality low distortion bass operating BELOW box resonance (60 Hz). Full technical details:
<https://sound-au.com/project48.htm>
- (2) Crossover point range 50Hz to 100Hz., / 24dB per octave. (75Hz recommended)
- (3) Amplification requirements: Min 1,000 AES watt **into 8 Ohm** amplification required. Off the shelf plate amps (RAM, Hypex, Dayton etc <https://usspeaker.com/homepage.htm>) or separate power amps.
- (4) “Flat” from 20 Hz to 100 Hz with **min SPL of 110 dB/1meter** at continuous full rated AES power (1,000 watts).
- (5) “Flat” from 20 Hz to 100 Hz with **min SPL of 116 dB/1 meter** with 6dB peak AES power (4,000 watts).
- (6) Maximum of **2dB** thermal compression at full rated continuous AES power (1,000 watts).
- (7) Sealed box **Q of 0.54** to ensure accurate time domain performance and critical damping.
- (8) Sub bass (40Hz or below) optimal driver loading matches mechanical Xmax (plus/minus 10mm) with thermal limits to ensure both limits are reached simultaneously.

Power response graph



Output response graph

